## REMARKS

This communication is responsive to the Office Action mailed 21 December 2010, as extended, where applicable, under the provisions of 37 CFR §1.136(a) by payment of the appropriate extension of time fees.

In this communication, the Applicant has:
- amended the description on page 32 and in paragraph [0045];
- amended claims 1, 9, 10 and 33 for clarity; and
- added new claims 35-55.

These amendments and new claims are submitted to be completely supported by the application as originally filed and to add no new matter.

## Amendments to the Description

The Applicant has added two new bulleted paragraphs to page 32 of the application.

These bulleted paragraphs are submitted to be completely supported by the application as originally filed. More particularly, these two new bulleted paragraphs describe subject matter that was originally included in the application as claims 19-22 (first bullet) and 29 (second bullet). Claims 19-22 clearly disclose that adjustment of the color model values of the pixels in the saturation region may be performed on pixels of the intermediate higher bit depth representation and that identification of saturated pixels may also be performed on pixels of the intermediate higher bit depth representation. Claim 29 clearly discloses that color model values of image data scanned and adjusted along different scan axes may be combined by obtaining an average of color model values along different scan axes to obtain intermediate values and blurring groups of adjacent pixels of the intermediate values to form the higher bit depth representation.

Accordingly, the Applicant submits that the amendment to page 32 of the description is completely supported by the application as filed.

The Applicant has also amended equations (3) of paragraph [0045] to remedy an obvious typographical error (see MPEP 2163.07). The change in equation (3) relates to the conditions for the first branch of the equation and modifies the expression "*for $0 \le x \le L_v$*" to read --*for $0 \le x \le v$*--. One skilled in the art would recognize this obvious error because the equation (3) conditions relate to pixel number indices. As clearly explained in the rest of paragraph [0045], the variables that relate to pixel number indices include: $x$ – the index of the pixel number in a saturation region; and $v$ – the index of the center pixel in the saturation regions; whereas the variable $L_v$ is a maximum scaling factor. Further, all of the other elements of the equation (3) conditions are expressed in terms of the center pixel index $v$.

One skilled in the art would also recognize that $v$ is the correct upper bound on the first equation (3) condition because such an upper bound would result in: an equation for determining a scaling factor $L(x)$ that is fully defined over the saturation region (e.g., all pixels with index $x$ in range $0 \le x \le 2v$); a suitable linear equation that defines a set of scaling factors $L(x)$ having a maximum scaling factor $L_v$ as is specified by the rest of paragraph [0045]; and an equation that defines a set of scaling factors that depend on the distance between a particular pixel and the edge of the saturation region as described, for example, in paragraph [0036] and recited, for example, in claim 1.

The Applicant submits, therefore, that the amendment to paragraph [0045] is not new matter because it corrects an obvious error.

## Compliance of the claims with 35 USC §112

The Examiner has raised 35 USC §112 in connection with claims 9, 10, 19, 22 and 29. The Applicant respectfully submits that claims 9, 10, 19, 22 and 29 (as amended) comply with the provisions of 35 USC §112 as explained in more particular detail below.

*Claim 9*

Claim 9 has been amended to recite that the function that determines adjustment magnitude "is one of <u>linearly</u> monotonically increasing and <u>linearly</u> monotonically decreasing from the start pixel toward a pixel located substantially midway between the start pixel and the end pixel and wherein the function is the other of <u>linearly</u> monotonically increasing and <u>linearly</u> monotonically decreasing from the pixel located substantially midway between the start pixel and the end pixel toward the end pixel".

The specification as originally filed at paragraph [0045] discloses that "a linear equation … may be used to determine the scaling factors." After the amendment discussed above, paragraph [0045] recites the following formula as an example of such a linear equation:

$$L(x) = \begin{cases} \frac{L_v - 1}{v} x + 1 & for\ 0 \leq x \leq v \\ \frac{1 - L_v}{v} x + 2L_v - 1 & for\ v < x \leq 2v \end{cases} \tag{3}$$

The specification explains that "$x$ is an index of the pixel number in a saturation region and it is assumed that $x = 0$ is the first saturated pixel; $v$ is the index of the center pixel in the saturation region; and $L_v$ is a maximum scaling factor."

Since the variable "$v$" is the index of the center pixel in the saturation region, the function $L(x)$ in formula (3) is "one of linearly monotonically increasing and linearly monotonically decreasing from the start pixel toward a pixel located substantially midway between the start pixel and the end pixel and … the other of linearly monotonically increasing and linearly monotonically decreasing from the pixel located substantially midway between the start pixel and the end pixel toward the end pixel," as is recited in amended claim 9. Accordingly, it is submitted that the subject matter of claim 9, as amended, is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention at the time the application was filed.

*Claim 10*

Claim 10, as amended, recites "wherein a value of the function is unity for at least one of: the start pixel and the end pixel." It is submitted that the originally-filed specification at paras. [0037]-[0041] discloses determining parameters ($L_v$ and $k$) of a function ($L(x)$) where the values of the function *L(x)* determine the magnitude of the scaling factors. Paragraph [0041] expressly recites that in some embodiments the "the scaling factors are selected to be unity at the beginning and end pixels of the saturation region". One skilled in the art would understand that scaling factor determining functions may be selected in the disclosed manner to have values of unity at the beginning and end pixels of the saturation region. Accordingly, it is submitted that the subject matter of claim 10, as amended, is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention at the time the application was filed.

*Claims 19, 22 and 29*

The Applicant has amended the description on page 32 to incorporate a description of the subject matter of claims 19, 22 and 29. These amendments are submitted to contain no new matter as discussed above. The Applicant submits that these amendments to the description describe subject matter which would reasonably convey, to those skilled in the art, that the inventors were in possession of the subject matter of claims 19, 22 and 29 at the time that the application was filed.

As identified by the Examiner, claims 19 and 22 recite "an intermediate higher bit depth representation of the image". The Applicant respectfully submits that the subject matter of this application continually refers to image data having a "lower bit depth representation" and image data having a "higher bit depth representation". In this context, a person skilled in the art would clearly understand that image data having an "intermediate" bit depth representation to have a bit depth somewhere in between the "lower" bit depth representation and the "higher" bit depth representation. This understanding is clearly exhibited by the Examiner on page 3 of the Office Action, where the Examiner expresses the view that an "intermediate" bit

depth representation would be "middle", "midway" or "transitional" between the lower bit depth representation and the higher bit depth representation.

Based on this reasoning, the Applicant submits that the originally filed specification (and now the description, as amended herein) describe the subject matter of claims 19, 22 and 29 in such a way as to reasonably convey to one skilled in the relevant art that the inventors had possession of the claimed invention at the time the application was filed.

## Compliance of the with 35 USC §101

The Office Action raises 35 USC §101 in connection with claims 1-33. The Applicant respectfully submits that claims 1-33, as amended, comply with 35 USC §101 as explained in more particular detail below.

### *Claims 1-32*

The Examiner expresses the view that claims 1-32 recite an abstract idea, ineligible for patent protection on the alleged basis that "the claimed process ... [is] drawn to the disembodied concept of human analysis and judgment (i.e., mental activity in the form of forming a judgment, observation, evaluation, or opinion), without any tangible implementation (e.g., no machine implementation or transformation of an article), and absent any observable and verifiable steps (i.e., all steps may be performed mentally)." The Applicant respectfully submits that the Examiner has mis-characterized the subject matter of claims 1-32 in view of MPEP 2016, the July 27, 2010 Memorandum to the Examining Corps titled *Interim Guidance for Determining Subject Matter Eligibility for Process Claims in View of Bilski v. Kappos* (the "Subject Matter Eligibility Memorandum"), and recent developments in the law.

Claim 1, as amended, recites:

1.    A method for converting image data of an image from a lower
      bit depth representation to a higher bit depth

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representation, the image having a saturation region wherein
a color model value of each individual pixel in the
saturation region is one of: above an upper saturation
threshold and below a lower saturation threshold, the method
comprising:
        identifying pixels in the saturation region; and
        adjusting the color model value of one or more
individual pixels in the saturation region by a
corresponding adjustment, a magnitude of each adjustment
dependent, at least in part, on a number of pixels between
the corresponding pixel and an edge of the saturation
region.
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*Claim 1 Recites Transformation of a Particular Article*

For the reasons that follow, the Applicant submits that claim 1 recites statutory subject matter at least because performance of the claim 1 method results in or otherwise involves a transformation of a particular article, namely <u>image data of an image having a saturation region</u>.

MPEP 2106(IV)(A) states that there are four statutory categories of invention (processes, machines, manufactures and compositions of matter) and that the only subject matter found to be outside of, or exceptions to, the four categories of invention "is limited to abstract ideas, laws of nature and natural phenomena." More particularly, MPEP 2106(IV)(A) states:

> The plain and unambiguous meaning of section 101 is that any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if it meets the requirements for patentability set forth in Title 35, such as those found in sections 102, 103, and 112. ...

> The subject matter courts have found to be outside of, or exceptions to, the four statutory categories of invention is limited to abstract ideas, laws of nature and natural

phenomena. ... These three exclusions recognize that *subject matter that __is not__ a practical application or use of an idea, a law of nature or a natural phenomenon is not patentable*.

MPEP 2106(IV)(C)(2) states that a claim is a patentable practical application of an idea, a law of nature or a natural phenomenon if it <u>transforms an article</u>. More particularly, MPEP 2106(IV)(C)(2) states:

> For claims including such excluded subject matter to be eligible for patent protection, the claim must be for a practical application of the abstract idea, law of nature, or natural phenomenon.

> A claimed invention is directed to a practical application of a 35 USC §101 judicial exception when it:
> (A) "transforms" an article or physical object to a different state or thing ...

The Subject Matter Eligibility Memorandum sets out a factor-based approach to determining whether a method claim is directed to patent eligible subject matter.

> *IV. Evaluating Method Claims for Eligibility:* Where the claim is written in the form of a method and is potentially a patentable process, as defined in 35 USC §100(b), the claim is patent-eligible so long as it is not disqualified as one of the exceptions to § 101's broad patent-eligibility principles; i.e., laws of nature, physical phenomena, and abstract ideas.

> Taking into account the following factors, the examiner should determine whether the claimed invention, viewed as a whole, is disqualified as being a claim to an abstract idea. Relevant factors—both those in favor of patent-eligibility and those against such a finding—should be weighed in making the determination. Factors that weigh in favor of patent-eligibility satisfy the criteria of the machine-or-transformation test or provide evidence that the abstract idea has been practically applied. Factors that weigh against patent-eligibility neither satisfy the criteria of the machine-or-transformation test nor provide evidence that the abstract idea has been practically applied. ...

The Subject Matter Eligibility Memorandum sets out a number of factors to be considered under heading "*B. Whether performance of the claimed method results in or otherwise involves a transformation of a particular article*". The Applicant submits that careful consideration of these factors leads to the conclusion that the subject matter recited in claim 1 is patent eligible under 35 USC §101. These factors and the Applicant's submissions as to how these factors bear on claim 1 (in italics) are set out below.

(1) The particularity or generality of the transformation. A more particular transformation would weigh in favor of eligibility.

*Claim 1 recites a highly specific transformation and provides a prescription for making the transformation, namely "adjusting the color model value of one or more individual pixels in the saturation region by a corresponding adjustment, a magnitude of each adjustment dependent, at least in part, on a number of pixels between the corresponding pixel and an edge of the saturation region."*

(2) The degree to which the recited article is particular; i.e., can be specifically identified (not any and all articles). A transformation applied to a generically recited article would weigh against eligibility.

*Claim 1 recites a highly particular article, namely "image data of an image … having a saturation region wherein a color model value of each individual pixel in the saturation region is one of: above an upper saturation threshold and below a lower saturation threshold."*

(3) The nature of the transformation in terms of the type or extent of change in state or thing, for instance by having a different function or use, which would weigh toward eligibility, compared to merely having a different location, which would weigh against eligibility.

*The transformation that results from claim 1 ("converting image data of an image from a lower bit depth representation to a higher bit depth representation") results in the*

*article (image) having distinctly different properties. More specifically, the transformed (higher bit depth image) has:*

  (i) *a different use (e.g., use in higher bit depth imaging systems; see, for example, paragraph [0008]); and*

  (ii) *improved function (e.g., improved appearance when renderred; see, for example, paragraph [0020]).*

(4) The nature of the article transformed, i.e., whether it is an object or substance, weighing toward eligibility, compared to a concept such as a contractual obligation or mental judgment, which would weigh against eligibility.

*The method of claim 1 transforms image data representing an image, which, it is submitted, is an object rather than a concept.*

(5) Whether its involvement is extrasolution activity or a field-of-use, i.e., the extent to which (or how) the transformation imposes meaningful limits on the execution of the claimed method steps. A transformation that contributes only nominally or insignificantly to the execution of the claimed method (e.g., in a data gathering step or in a field-of-use limitation) would weigh against eligibility.

*The article (image data) being transformed by the claim 1 method is integrally involved in the claim 1 method from start to finish. Every step of claim 1 contributes to the particular transformation of image data that results from executing the claim 1 method. The steps of claim 1 are not extrasolution activity. The steps of claim 1 which transform the image data are not merely field of use limitations. Indeed, the very point of the method of claim 1 (as recited in its preamble) is to transform image data of an image having a saturation region.*

Accordingly, it is submitted that claims 1-32 recite statutory subject matter at least because performance of the method recited in claim 1 <u>results in or otherwise involves a transformation of a particular article</u>, namely image data of an image having a saturation region.

*Claims 1-32 Recite more than Abstract Ideas*

In addition to the considerations set out above, recent developments in the law compel the conclusion that claim 1 recites statutory subject matter. *Research Corporation Technologies Inc. v. Microsoft Corp.*, 97 USPQ2d 1274 (F. Cir. 2010) ("*RCT v. Microsoft*", copy enclosed) was decided on 8 December 2010, and published in the United States Patent Quarterly on 24 January 2011. In that case, Chief Judge Rader of the Court of Appeals for the Federal Circuit (CAFC), held that a method for halftoning digital images was not an abstract idea, and therefore was patent eligible subject matter.

The following claim was among those allowed by the CAFC in *RCT v. Microsoft*:

> 1.    A method for the halftoning of gray scale images by utilizing a pixel-by-pixel comparison of the image against a blue noise mask in which the blue noise mask is comprised of a random non-deterministic, non-white noise single valued function which is designed to produce visually pleasing dot profiles when thresholded at any level of said gray scale images.

It is submitted that since this claim is equally susceptible to the rationale supplied by the Office Action in rejecting claims 1-32 of the instant application, the rationale supplied by the Office Action is invalid, and the rejection of claims 1-32 under 35 USC §101 should be withdrawn for this reason alone.

It is further submitted that the logic of the CAFC in *RCT v. Microsoft* which held that methods for halftoning digital images constitute statutory subject matter applies in a substantially analogous manner to methods for adjusting the bit depth of digital image data while improving image characteristics in saturation regions as recited in claims 1-32 of this application. Reflecting on the meaning of the word "abstract" in view of the Supreme Court decision in *Bilski v. Kappos*, 130 S. Ct. 3218 (2010), the Chief Judge stated (at 1280):

> this court also will not presume to define "abstract" beyond the recognition that this disqualifying characteristic *should exhibit itself so manifestly as to override* the broad

statutory categories of eligible subject matter and the statutory context that directs
primary attention on the patentability criteria of the rest of the *Patent Act*.

In considering the specifics of the invention defined by the claims, the court observed (at 1280)
that "[t]he invention presents functional and palpable applications in the field of computer
technology" and noted (at 1280) that "*inventions with specific applications or improvements to
technologies in the marketplace are not likely to be so abstract that they override the statutory
language and framework of the Patent Act.*"

It is submitted that, like the method at issue in *RCT v. Microsoft*, the methods of claims 1-32
present functional and palpable applications in the field of computer-based digital image
technology.  They also provide "specific improvements to technologies in the marketplace"
(e.g., by addressing the desires identified at paragraph [0008] of the application) and have
"specific applications ... to technologies in the marketplace" (e.g., to the variety of non-
limiting example image processing systems listed in the application at paragraph [0068]).

Futhermore, the court in *RCT v. Microsoft* observed at 1280 that the fact that a method
incorporates algorithms and formulas does not in itself make the invention abstract non-
statutory subject matter:

> the claimed methods incorporate algorithms and formulas that control the masks and
> halftoning. These algorithms and formulas, even though admittedly a significant part of
> the claimed combination, *do not bring this invention even close to abstractness that
> would override the statutory categories and context*.

It is submitted that the same can be said of the methods claimed in the instant application: the
algorithms and formulas incorporated in claims 1-32 recite subject matter sharing a similar
level of abstractness to those claims allowed in *RCT v. Microsoft* and *do not bring this
invention even close to abstractness that would override the statutory categories and context*
that define patent-eligible subject matter.

*Conclusions with respect to Claims 1-32*

Based on the reasoning presented above, the Applicant respectfully submits that claims 1-32 recite patent eligible subject matter under 35 USC §101.

*Claim 33*

The Examiner has raised 35 USC §101 in connection with claim 33, expressing the view that the originally filed claim 33 language admits transitory signals which are non-statutory subject matter. The Applicant has amended claim 33 in accordance with the Examiner's suggestion to recite that the computer program product comprises "a <u>non-transitory</u> medium carrying computer readable instructions ...". The Applicant submits that this amendment obviates the Examiner's concern with the patent eligibility of claim 33.

**Non-Statutory Double Patenting Rejection**

The Office Action raises the judicially created doctrine of obviousness-type double patenting in connection with claims 1-4, 6, 8, 14, 18-19, 30, 33 and 34 based on claims 1-5 and 7-11 of co-pending US Patent Application No. 11/831521.

The instant application and US Patent Application No. 11/831521 are co-owned, as shown by the Statements under 37 CFR §3.73(b) filed 15 February 2008 on both this application and on US Patent Application No. 11/831521, both of which are viewable in PAIR.

The Applicant notes that the Examiner has raised a similar obviousness-type double patenting objection in connection with co-pending application No. 11/831521. The Applicant advises that it filed a terminal disclaimer (together with the required fee) in co-pending application No. 11/831521 as part of the response filed on 4 March 2011. The Applicant submits that the filing of this terminal disclaimer in co-pending application No. 11/831521 obviates the obviousness-type double patenting objection raised in connection with the instant application.

**Allowability of Claims over Cited Prior Art**

The Office Action raises US patent No. 7286702 ("Oohara") in connection with claims 1, 33 and 34, the combination of Oohara and WO2003/071781 (Jarman) in connection with claims 2-18 and 23-26 and the combination of Oohara, Jarman and US6038576 (Ulichney) in connection with claims 19-22 and 27-32. The Applicant respectfully submits that the currently pending claims patentably distinguish these references cited by the Examiner.

Claims 1 and 33 recite, *inter alia*, "adjusting the color model value of each of the individual pixels in the saturation region by a corresponding adjustment, a magnitude of each adjustment dependent, at least in part, on <u>a number of pixels between the corresponding pixel and an edge of the saturation region.</u>" Claim 34 recites a similar feature, namely a "processor configured to: ... adjust the color model value of each of the individual pixels in the saturation region by a corresponding adjustment, a magnitude of each adjustment dependent, at least in part, <u>on a number of pixels between the corresponding pixel and an edge of the saturation region.</u>" Oohara, as understood by the Applicant, does not teach or suggest this feature of claims 1, 33 and 34.

In contrast, Oohara, as understood, discloses that the magnitude of adjustments to saturation (i.e., the absolute difference between saturation C before conversion and saturation C' after conversion) is based on only the saturation C before conversion and the predetermined threshold $\alpha$ below (or above) which pixels are converted (see formulas (4) and (5) in col. 10; formula (6) in col. 12). As understood, neither saturation C before conversion nor the threshold $\alpha$ depends on (or specifically determines) <u>the number of pixels between the corresponding pixel (i.e. the pixel being converted) and the edge of the saturation region.</u> Consider that two identically valued pixels in a saturation region may be at different distances from the boundary of the saturation region: according to Oohara's conversion the magnitude of adjustments to the pixels would be the same. The fact that Ooohara's threshold $\alpha$ may be based on a number or ratio of pixels has no bearing on the location of the edge of the saturation area relative to any particular pixel in the area. Thus, as understood, Oohara fails to disclose the feature of a magnitude of each pixel's adjustment being dependent, at least in part, on "<u>a number of pixels between the corresponding pixel and an edge of the saturation region</u>" as recited in the independent claims of this application.

Based on this reasoning, claims 1, 33 and 34 are submitted to be patentable over Oohara.

The Examiner raises the combination of Oohara and Jarman in connection with claims 2-18 and 23-26. As understood, Jarman fails to remedy the deficiencies with Oohara. Accordingly, the Applicant submits that claims 2-18 and 23-26 patentably distinguish the combination of Oohara and Jarman as cited by the Examiner.

The Examiner raises the combination of Oohara, Jarman and Ulichney in connection with claims 19-22 and 27-32. As understood, Ulichney fails to remedy the deficiencies with Oohara and Jarman. Accordingly, the Applicant submits that claims 19-22 and 27-32 patentably distinguishes the combination of Oohara, Jarman and Ulichney as cited by the Examiner.

**New Claims 34-55**

The Applicant has added new claims 34-55 for which patent protection is sought. These claims are submitted to be completely supported by the application as originally filed and to add no new matter.

**Information Disclosure Statements**

The Applicant observes that the Examiner has acknowledged receipt and consideration of the Applicant's Information Disclosure Statements filed on 05/17/2007, 12/03/2007 and 06/23/2008. The Applicant filed an additional Information Disclosure Statement on 12/16/2010 and respectfully requests that the Examiner acknowledge receipt and consideration of same.

## <u>Conclusion</u>

It is submitted that this response addresses all of the issues raised in the Office Action.  It is submitted that this application is in condition for allowance, which is respectfully requested.


Respectfully submitted,


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